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H. E. Hurlburt, E. J. Metzger, A. J. Wallcraft, and P. J. Hogan

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Results from a 1/8 degree Pacific Ocean model (.125 degree, .176 degree resolution lat, long for each variable are compared with results from several versions of a model with 1/4 degree resolution. All of the models are layered primitive equation, cover the Pacific Ocean north of 20S, include marginal seas, and have a free surface. The 1/8 degree model has 2 layers and realistic topography. The versions of the 1/4 degree model are 1.5 and 3.5 layer reduced gravity and 2-layer finite depth with realistic topography or a flat bottom.
These models are used to show (1) the effects of horizontal resolution and vertical structure on flow instabilities and (2) the relative importance of time-varying wind and flow instabilities in producing a time dependent oceanic response. For example, flow instabilities are most widespread in the 3.5 layer reduced gravity model. The barotropic mode has the largest impact on flow instabilities in the Kuroshio region. A salient difference between the 1/8 degree model and the corresponding 1/4 degree model the maximum occurs near the end of the inertial jet between 155 degree E and 160 degree E. In the 1/8 degree*

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*model they are much more widespread, extending from south of Japan to 160 degree E and northward to about 40 degree N and the subarctic front, more like the RMS variability patterns from GEOSAT altimetry. All of the models simulate the basic fea-tures of the North Pacific, including the subtropical and subpolar gyres, the major current systems (Kuroshio, Oyashio, North Equatorial, Mindanao, North Equatorial Countercurrent) and associated fronts including the subarctic and the Kuroshio extension. Only the models with realistic topo-graphy exhibit the bifurcation of the Kuroshio at the Shatsky rise and only the 3.5-layer reduced gravity model simulates the equatorial undercurrent.

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A 1/8° Model of the North Pacific Ocean

H E Hurlburt and E J Metzger (Both at: Naval Oceanographic and Atmospheric Research Laboratory, Code 323, Stennis Space Center, MS 39529-5004; 601-688-4626; GTE Mail H.Hurlburt)
A J Wallcraft (JAYCOR, Bldg 1103, Stennis Space Center, MS 39529)
P J Hogan (Sverdrup Technologies, Bldg 2109, Stennis Space Center, MS 39529)

Results from a 1/8° Pacific Ocean model (.125°, .176° resolution lat, long for each variable) are compared with results from several versions of a model with 1/4° resolution. All of the models are layered primitive equation, cover the Pacific Ocean north of 20S, include marginal seas, and have a free surface. The 1/8° model has 2 layers and realistic topography. The versions of the 1/4° model are 1.5 and 3.5 layer reduced gravity and 2-layer finite depth with realistic topography or a flat bottom.

These models are used to show (1) the effects of horizontal resolution and vertical structure on flow instabilities and (2) the relative importance of time-varying winds and flow instabilities in producing a time dependent oceanic response. For example, flow instabilities are most widespread in the 3.5 layer reduced gravity model. The barotropic mode has the largest impact on flow instabilities in the Kuroshio region. A salient difference between the 1/8° model and the corresponding 1/4° model is the distribution of the eddy generation and oceanic variability in the Kuroshio region. In the 1/4° model the maximum occurs near the end of the inertial jet between 155°E and 160°E. In the 1/8° model they are much more widespread, extending from south of Japan to 160°E and northward to about 40°N and the subarctic front, more like the RMS variability patterns from GEOSAT altimetry. All of the models simulate the basic features of the North Pacific, including the subtropical and subpolar gyres, the major current systems (Kuroshio, Oyashio, North Equatorial, Mindanao, North Equatorial Countercurrent) and associated fronts including the subarctic and the Kuroshio extension. Only the models with realistic topography exhibit the bifurcation of the Kuroshio at the Shatsky rise and only the 3.5-layer reduced gravity model simulates the equatorial undercurrent.